

IN THE US PATENT OFFICE

EXAMINER

GROUP

SN -

FILED - concurrently herewith

BY - Ogino

OUR REF: 9915312(122)

SIRS:

Kindly amend the above as follows:

Claims 1-60, cancel without prejudice

Add claims 61-106, appearing in the Appendix attached hereto.

REMARKS

Claims 61-106 are in the application. Claims 1-60 have been redrafted and cancelled to expedite prosecution. They have been replaced by new claims 61-106, which have been drafted to conform to US practice and avoid unnecessary numbers of claims. Entry thereof is respectfully solicited.

The Fee Calculation Sheet shows the total fee due after such amendment.

Respectfully

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23 May 01

I hereby certify that the correspondence upon which this notice is placed is being deposited with the US Postal Service as first class mail in an envelope addressed to the Commissioner of Patents Washington, D.C. 20231 on the date set forth below.

MOONRAY KOJIMA, ATTORNEY

DATE:

5/23/01

[illegible]

defining in a plurality of modes a pixel group comprising a plurality of pixels containing said pixel of interest and a pixel group comprising a plurality of pixels not overlapping those in said former pixel group, in said region;

producing an image using a selected pixel value of a pixel group containing said pixel of interest in a selected pixel group mode, as a new pixel value for said pixel of interest.

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        calculating an average pixel value of said pixel group
containing said pixel of interest in said selected pixel group
mode;

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calculating an average pixel value of said region; and
wherein said image is produce by using a pixel value
obtained from a weighted addition of said average pixel value
of said pixel group and said average pixel value of said region.

APPENDIX "A"

of

performing a weight addition on said average pixel value of said pixel group and said average pixel value of said region; and

wherein said image is produced using a pixel value obtained from a weighted addition of said pixel value obtained from said former weighted addition and a pixel value of said pixel of interest.

64. The method of claim 63, further comprising the steps of

performing a weighted addition on said produce image and said original image.

65. The method of claim 64, wherein an adjustable weighting factor is used for the weighted addition.

66. The method of claim 62, wherein said weighted addition uses a weighting factor which is a function of a minimum value of a total sum of respective residual sums of squares of pixel values of said pixel groups, said total sum being calculated for each of said pixel group modes.

67. The method of claim 66, wherein said function is a function which makes a weight for said average pixel value of said region maximum when the minimum value and the maximum value of said total sum of residual sums of squares are equal, and reduces weight for said average pixel value of said region as a minimum value of said total sum of residual sums of squares

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said pixel groups is closes to variance of n e of said original image multiplied by number of pixels in said pixel group mode.

72. The method of claim 61, wherein said region is defined in a plurality of modes.

73. The method of claim 62, wherein said region is defined in a plurality of modes.

74. The method of claim 63, wherein said region is defined in a plurality of modes.

75. The method of claim 64, wherein said region is defined in a plurality of modes.

76. An image processing apparatus comprising:

a region defining means for defining a region containing a pixel of interest in an original image;

pixel group defining means for defining in a plurality of modes a pixel group comprising a plurality of pixels containing said pixel of interest and a pixel group comprising a plurality of pixels not overlapping those in the former pixel group, in said region;

selecting means for selecting a pixel group mode from said defined plurality of pixel group modes which best fits a structure of said original image in said region; and

image producing means for producing an image using a selected pixel value of a pixel group containing said pixel of interest in a selected pixel group mode, as a new pixel value for

said pixel of interest.

77. The apparatus of claim 76, further comprising:
first pixel value calculating means for calculating an average pixel value of said pixel group containing said pixel of interest in said selected pixel group mode;

said pixel value calculating means for calculating an average pixel value of said region; and wherein

said image producing means comprises means for producing an image using a pixel value obtained from a weighted addition of said average pixel value of said pixel group and said average pixel value of said region, as a new pixel value for said pixel of interest.

78. The apparatus of claim 77, further comprising:

first addition means for performing a weighted addition on said average pixel value of said pixel group and said average pixel value of said region; and wherein

said image producing means comprises means for producing an image using a pixel value obtained from a weighted addition of said pixel value obtained from said former weighted addition and a pixel value of said pixel of interest, as a new pixel value of interest.

79. The apparatus of claim 78, wherein

said image producing means comprises means for producing an image using a pixel value obtained from a weighted addition

of said pixel value obtained from said former weighted addition and a pixel value of said pixel of interest, as a new pixel value for said pixel of interest; and further comprising:

second addition means for performing a weighted addition on said produced image and said original image. .

80. The apparatus of claim 79, wherein said weighted addition uses an adjustable weighting factor.

81. The apparatus of claim 77, wherein said weighted addition uses a weighting factor which is a function of a minimum value of a total sum of respective residual sums of squares of pixel values of said pixel groups, said total sum being calculated for each of said pixel group modes.

82. The apparatus of claim 81, wherein said function is a function which makes a weight for said average pixel value of said region maximum when minimum value and maximum value of said total sum of residual sums of squares are equal, and reduces weight for said average pixel value of said region as a minimum value of said total sum of residual sums of squares becomes smaller with respect to maximum value.

83. The apparatus of claim 78, wherein said weighted addition uses a weighting factor which is a function of minimum value of said total sum of residual sums of squares of pixel values of said pixel groups, said total sum being calculated for each of said pixel group modes, and variance of noise of said origi-

inal image.

84. The apparatus of claim 83, wherein said function is a function which makes a weight for pixel value obtained from said former weighted addition maximum when minimum value of said total sum of residual sums of squares divided by number of pixels in said pixel group mode is equal to said variance of noise and reduces weight for said pixel values obtained from said former weighted addition as difference between said minimum value of said total residual sum of squares divided by number of pixels in said pixel group mode and said variance of noise becomes larger.

85. The apparatus of claim 76, wherein said selecting means comprises means for selecting a pixel group mode in which a total sum of residual squares of pixel values of said pixel groups is minimum.

86. The apparatus of claim 76, wherein said selecting means comprises means for selecting a pixel group mode in which said total sum of residual sums of squares of pixel values of said pixel groups is close to variance of noise of said original image multiplied by number of pixels in said pixel group mode.

87. The apparatus of claim 76, wherein said region defining means comprises means for defining in a plurality of modes a region containing a pixel of interest in an original image.

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88. The apparatus of claim 77, wherein said region defining means comprises means for defining in a plurality of modes a region containing a pixel of interest in an original image.

89. The apparatus of claim 78, wherein said region defining means comprises means for defining in a plurality of modes a region containing a pixel of interest in an original image.

90. The apparatus of claim 79, wherein said region defining means comprises means for defining in a plurality of modes a region containing a pixel of interest in an original image.

90. The apparatus of claim 79, wherein said region defining means comprises means for defining in a plurality of modes a region containing a pixel of interest in an original image.

91. A recording medium which records in a computer readable manner a program for a computer to perform the functions of:

defining a region containing a pixel of interest in an original image;

defining in a plurality of modes a pixel group comprising a plurality of pixels containing said pixel of interest and a pixel group comprising a plurality of pixels not overlapping those in the former group, in said region;

selecting a pixel group mode from said defined plurality of pixel group modes which best fits a structure of said original image in said region; and

producing an image using a selected pixel value of a pixel

Appendix "H"

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further functions of

performing a weighted addition on said produced image and said original image.

95. The recording medium of claim 91 which records in a computer readable manner a program for a computer to perform the further functions, wherein said region is defined in a plurality of modes.

96. The recording medium of claim 92 which records in a computer readable manner a program for a computer to perform the further functions, wherein said region is defined in a plurality of modes.

97. The recording medium of claim 93 which records in a computer readable manner a program for a computer to perform the further functions, wherein said region is defined in a plurality of modes.

98. The recording medium of claim 94 which records in a computer readable manner a program for a computer to perform the further functions, wherein said region is defined in a plurality of modes.

99. An imaging apparatus comprising:

a signal collecting means for collecting a signal from an object;

an original image producing means for producing an original image based on said collected signal;

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a region defining means for defining a region containing a pixel of interest in said original image;

pixel group defining means for defining in a plurality of modes a pixel group comprising a plurality of pixels containing said pixel of interest and a pixel group comprising a plurality of pixels not overlapping those in said former pixel group, in said region;

selecting means for selecting a pixel group mode from said defined plurality of pixel group modes which best fits a structure of said original image in said region; and

image producing means for producing an image using an average pixel value of said pixel group containing said pixel of interest in said selected pixel group mode, as a new pixel value for said pixel of interest.

100. The apparatus of claim 99, further comprising

first pixel value calculating means for calculating an average pixel value of said pixel group containing said pixel of interest in said selected pixel group mode;

second pixel value calculating means for calculating an average pixel value of said region; wherein said

image producing means comprises means for producing a pixel value obtained from a weighted addition of said average pixel value of said pixel group and said average pixel value of said region, as a new pixel value for said pixel of interest.

APPENDIX "K"

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101. The apparatus of claim 100, further comprising:

first addition means for performing a weighted addition on said average pixel value of said pixel group and said average pixel value of said region; and wherein

said image producing means comprises means for producing an image using a pixel value obtained from a weighted addition of said pixel value obtained from said former weighted addition and a pixel value of said pixel of interest, as a new pixel value for said pixel of interest.

102. The apparatus of claim 101, further comprising:

second addition means for performing a weighted addition on said produced image and said original image.

103. The apparatus of claim 99, wherein said region defining means comprises means for defining in a plurality of modes a region containing a pixel of interest in an original image.

104. The apparatus of claim 100, wherein said region defining means comprises means for defining in a plurality of modes a region containing a pixel of interest in an original image.

105. The apparatus of claim 101, wherein said region defining means comprises means for defining in a plurality of modes a region containing a pixel of interest in an original image.

APPENDIX "L"

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